

“TIME IS MONEY” - BENJAMIN FRANKLIN -

The majority of organizations working within the AEC marketplace have their own remote offices and project personnel located in trailers on-site; or, they are collaborating with firms outside their own domain. It is our belief that those organizations are looking for any way possible to **reduce cost** and **increase efficiency**. Collaboration Systems Group (CSG) would like to introduce you to a technology that allows you to look at Remote Office Collaboration, and possibly Consolidation, in a new light.

riverbed Steelhead devices provide a superb hardware/software platform - that when combined with our expertise in the world of digital design - can provide a solution for your organization **that no one else can offer**. Numerous design and construction firms - large and small, some of which you may already be working with - have recognized significant improvements in their digital communication capabilities with the use of Riverbed.

Traditionally, we've not been able to consolidate hardware in remote offices - let alone remote users attempting to use the Autodesk Revit Workshare schema. This is due primarily to our Wide Area Network (WAN) connections. The speed of these connections has simply been too slow. WAN speeds do not provide for the adequate delivery of the Revit worksets, and the "Save to Central" and "Reload Latest" functions add to the dilemma. **Adding bandwidth alone, in an effort to address the speed problem, does nothing to address the real issue - LATENCY, and the way that the transmission protocol (TCP/IP) is designed.**

The schema provided by Autodesk to accomplish Worksharing is well defined and when used correctly ensures that conflicts within a project do not occur. This schema works well when all project participants are located within the same office and connected to the Central File via a LAN connection. Recognizing that **LATENCY** has been the main culprit to their speed issue when attempting to work with external partners or offices, Autodesk has recently developed a scheme based on a local server technology - Revit Server. While Revit Server will alleviate some of the slowness of the "open" and "sync" process for those in remote locations, it should be noted that Revit Server does not address the issue of WAN **LATENCY**, and, that Revit Server only works on the Revit files. As indicated in the below tables severe performance issues arise when attempting to incorporate Remote Revit Users into the Workshare of a project.

**ENHANCE EFFICIENCIES
450 TO 600%**

The below tables provide a summary of just how well Riverbed optimizes WAN connections so that Remote Offices and Collaborative Partners can work with the Revit Central File using the standard Revit work processes.

**Revit Server Technology
Architecture 2011
2 Servers – Domain Independent
75.96MB RVT File**

**Revit Architecture 2011
75.96MB RVT File**

8 minutes 38 seconds	Open from Main Central File without Riverbed
2 minutes 34 seconds	First (Cold) Open from Data Center with Riverbed Enabled
50 seconds	Open (Warm) from Main Central File with Riverbed Enabled
1 minutes 39 seconds	Synchronize to Main Central File without Riverbed Enabled
43 seconds	Synchronize to Main Central File with Riverbed Enabled

2 minutes 56 seconds	Open from Main Central File without Riverbed
2 minutes 7 seconds	First (Cold) Open from Data Center with Riverbed Enabled
56 seconds	Open (Warm) from Main Central File with Riverbed Enabled
4 minutes 27 seconds	Synchronize to Main Central File without Riverbed Enabled
41 seconds	Synchronize to Main Central File with Riverbed Enabled

Revit Server Technology

	Time to Complete	Time Improvement	Time Reduction
Baseline	8.63 minutes		
Steelhead Cold	2.56 minutes	3.35x	70.3%
Steelhead Warm	0.83 minutes	10.4x	90.3%
Sync to Central w/o Riverbed	1.65 minutes		
Sync to Central with Riverbed	0.72 minutes	2.3X	56.3%

Revit Architecture 2011

	Time to Complete	Time Improvement	Time Reduction
Baseline	2.93 minutes		
Steelhead Cold	2.12 minutes	1.35x	27.6%
Steelhead Warm	0.93 minutes	3.15x	68.3%
Sync to Central w/o Riverbed	4.45 minutes		
Sync to Central with Riverbed	0.68 minutes	6.54X	84.7%

The Equipment used: On the Central Server side, a Steelhead 1050H device supporting 10Mbps is installed. The Steelhead Mobile client software is being used on the Remote. The remote office has a business-class cable connection to the internet, with 17.38Mbps down and 1.60Mbps up. A HP Elitebook 8530 workstation, with 3MB RAM and Windows XP 32-bit running Revit Architecture 2011 is on the client side.

Un-optimized WAN connection speeds do not provide for the adequate delivery of the Revit Models and associated worksets to any of the remote users. Yes, Revit Server can alleviate some of the pain; however, as can be noted with these numbers some pain remains. Beyond the initial movement of the models, the recommended work process associated with Revit requires an interaction with the Central Model during the course of daily design activities. These "Save to Central" and "Reload Latest" functions add to the dilemma of attempting to share models in a collaborative design environment.

“LOST TIME IS NEVER FOUND AGAIN”
- BENJAMIN FRANKLIN -

How would the introduction of Riverbed reflect positively on your organization and what hard dollars could be attributed to this increase in productivity? If we concentrate solely on the time savings related to working within the Revit environment, with a dispersed team, we can show significant savings. Since the work process associated with Revit differs from organization to organization (how often is a Save to Central and Reload Latest mandated) it is difficult to provide a standard dollar amount that can be saved. However, if we make some general assumptions we can provide some guidance.

- Opening the Model will be done twice a day by each user – once in the morning and once in the afternoon.
- Save to Central will be done eight times a day by each user.
- You are using Revit Architecture 2011, which has time improvements over previous versions of Revit.
- The Revit model has a size of 75MB.
- The environment is similar to the environment we used to provide the time test. CSG strongly encourages our “Proof of Concept” program as a means of testing on your own network.
- Connection is via a standard VPN.
- The design team has an average operational burden factor of \$ 75.00 per hour per individual.

Running Revit Architecture 2011 without Riverbed:

Each open of the Revit Model: 2 minutes, 56 seconds - Two "opens" of the Model per day equals 5 minutes, 52 seconds per day waiting on opening the Model (per project team member).

Each Sync to the Central File: 4 minutes, 27 seconds - Sync to Central File eight times a day (once per hour): 35 minutes, 36 seconds per day waiting for Syncing to the Central File (per project team member)

This is 41 minutes, 28 seconds in a person's 8 hour day, or roughly 8.6% of a person's day, spent waiting.

At \$75 per hour, this equates to a loss of \$51.75 per day, per user.

There are 250 working days in a year (5 days X 50 weeks), which equates to a loss of \$12,938 per year, or \$6.47 per hour, per person on the project.

Running Revit Architecture with Riverbed:

Each "Warm" open (model has been opened once): 56 seconds - Two "opens" of the Model per day: 1 minute, 52 seconds per day waiting on opening the Model (per project

team member)

Each Sync to Central File: 41 seconds - Sync to Central File 8 times in a day (once per hour): 5 minutes, 28 seconds per day waiting for Syncing to the Central File (per project team member)

This is 7 minutes, 20 seconds in a person's 8 hour day, or roughly 1.52% of a person day spent waiting.

At \$75 per hour, this equates to a loss of \$11.45 per day, per user.

There are 250 working days in a year (5 days x 50 weeks), which equates to a loss of \$2,862 per year, or \$1.43 per hour, per person on the project.

With the Riverbed Solution in place, we'll return \$10,076 per year back to the company, per user. This equates to \$5.04 per hour. If we have 4 project team members working on this project, then we are returning a combined \$20.15 per hour back to the company, simply by eliminating the wait time in opening and syncing to the Model across the WAN/VPN connection.

Running Revit Server Technology with Architecture 2011 without Riverbed:

Each open of the Revit Model: 8 minutes, 38 seconds - Two "opens" of the Model per day equals 17 minutes, 16 seconds per day waiting on opening the Model (per project team member).

Each Sync to the Central File: 1 minutes, 39 seconds - Sync to Central File eight times a day (once per hour): 13 minutes, 12 seconds per day waiting for Syncing to the Central File (per project team member)

This is 30 minutes, 28 seconds in a person's 8 hour day, or roughly 6.35% of a person's day, spent waiting.

At \$75 per hour, this equates to a loss of \$38.08 per day, per user.

There are 250 working days in a year (5 days X 50 weeks), which equates to a loss of \$9,520 per year, or \$4.76 per hour, per person on the project.

Running Revit Server Technology with Architecture 2011 with Riverbed:

Each "Warm" open (model has been opened once): 50 seconds - Two "opens" of the Model per day: 1 minute, 40 seconds per day waiting on opening the Model (per project team member)

Each Sync to Central File: 43 seconds - Sync to Central File 8 times in a day (once per hour): 5 minutes, 44 seconds per day waiting for Syncing to the Central File (per

project team member)

This is 7 minutes, 24 seconds in a person's 8 hour day, or roughly 1.54% of a person day spent waiting.

At \$75 per hour, this equates to a loss of \$9.25 per day, per user.

There are 250 working days in a year (5 days x 50 weeks), which equates to a loss of \$2,312 per year, or \$1.16 per hour, per person on the project.

With the Riverbed Solution in place, we'll return \$7,208 per year back to the company, per user. This equates to \$3.60 per hour. If we have 4 project team members working on this project, then we are returning a combined \$14.40 per hour back to the company, simply by eliminating the wait time in opening and syncing to the Model across the WAN/VPN connection.

	Revit Arch. w/o Riverbed	Revit Arch. w/ Riverbed	Revit Server w/o Riverbed	Revit Server w/ Riverbed
Time to Open Model	2 minutes 56 seconds	50 seconds	8 minutes 38 seconds	50 seconds
Time to Synch to Model	4 minute 27 seconds	43 seconds	1 minute 39 seconds	43 seconds
Total Time – from above detail	41 minutes 28 seconds	7 minutes 24 seconds	30 minutes 28 seconds	7 minutes 24 seconds
Time (Lost) or Gained with the use of Riverbed	34 minutes 4 seconds	34 minutes 4 seconds	23 minutes 4 seconds	23 minutes 4 seconds
Money (Lost) or Gained – from above detail	\$ 10,076	\$ 10,076	\$ 7,208	\$ 7,208

Equipment cost:

Assuming four people, located in one of your remote offices, need to be involved in this project, your total cost over a 3 year period for the Riverbed devices, services, and maintenance is \$6,395. Over a 3 year period, that equates to \$1.02 per hour, or divided by the number of Project team members on this project (4), equates to 25.5 cents per hour, per user.

Conclusion:

The "cost" of the Riverbed solution in this specific example is \$1.02 per hour. The "return" back to the company varies based on the underlining technology that you elect to use – Revit Server or Revit Architecture. With Revit Architecture your ROI is \$20.15 per hour, resulting in a Net Gain of \$19.13 per hour. With the Revit Server technology your ROI is \$14.40 per hour, resulting in a Net Gain of \$13.38 per hour.

riverbed is an enabling technology that supports the dynamic change in the way that your organization will conduct business in the future. It is a technology that will provide you and your organization with a distinct competitive advantage. As Mr. Franklin so eloquently stated - Time is Money – and the advantages you gain with a Riverbed solution equate to an increase in operational efficiency and a decrease in overhead.

Collaboration Systems Group (CSG) has been addressing the Revit model sharing issue utilizing Riverbed devices since 2007. Because of Riverbed's WAN optimization techniques, through compression and de-duplication, the Riverbed solution allows the remote project team members a connection to the same Central File that the LAN users are connected to. We are essentially taking the Autodesk-recommended, LAN-based workflow and incorporating the WAN-based users, as if they are all sitting in the same room. There is no duplication of Revit models, no copying of Revit models, any "background" sync of Revit models, no local caching servers. Your users, and project team members, work on the Central File as if they are sitting next to the server, regardless of their physical location.

Our unique Try & Buy program will let you evaluate the positive impact Riverbed technologies can provide in your efforts to collaborate with remote offices, partner firms, and individual users. There is no need to buy Riverbed equipment to test it, and we typically deploy the solution over lunch. No need to purchase and configure new servers, no additional IT requirements, and we make no changes to your network. The Riverbed solution simply addresses **LATENCY** and removes that obstacle, enabling optimization to occur over your existing WAN and/or VPN connections

CSG's experience with IT and infrastructure solutions makes us an ideal partner for any firm looking for disaster recovery solutions, network infrastructure consolidation / virtualization, and overall cost savings initiatives. CSG hosts monthly webinars on these subjects, as well as, BIM(Revit)/CAD/Office Collaboration. Please visit us at an event near you. We look forward to becoming part of your team!! For more information, please call 866-376-8571, or visit us at www.cs-grp.net

Can you really afford not to be using **riverbed** Steelhead?